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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/737,038	12/16/2003	Min Yang	YOR920030313US1	4758

24299 7590 10/19/2005

GEORGE SAI-HALASZ
303 TABER AVENUE
PROVIDENCE, RI 02906

EXAMINER	
WILLIAMS, DON J	

ART UNIT	PAPER NUMBER
2878	

DATE MAILED: 10/19/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/737,038	YANG, MIN	
	Examiner	Art Unit	
	Don Williams	2878	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *12/16/2005*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-13* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-13 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☒ Claim(s) *14-23* are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Election/Restrictions

Restriction to one of the following inventions is required under 35 U.S.C. 121:

I. Claims 1-13, drawn to photodetector classified in class 250 subclass 214.1.

II. Claims 14-23, drawn to "Method for fabricating a photodetector, classified in class 438.

Inventions I and II are related as process of making and product made. The inventions are distinct if either or both of the following can be shown: (1) that the process as claimed can be used to make other and materially different product or (2) that the product as claimed can be made by another and materially different process (MPEP § 806.05(f)). In the instant case, the photodetector of invention I can be made by a process different from that of invention II.

Because these inventions are distinct for the reasons given above and have acquired a separate status in the art as shown by their different classification, restriction for examination purposes as indicated is proper.

During a telephone conversation with Mr. Hal-Salasz on Wednesday, October 6, 2005 a provisional election was made without traverse to prosecute the invention of claims 1-13. Affirmation of this election must be made by applicant in replying to this Office action. Claims 14-23 are withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1-4, 7-9, 11-13 are rejected under 35 U.S.C. 102(e) as being anticipated by Ouyang et al (US2005/0093021).

As to claim 1, Ouyang et al disclose a monocrystalline Si well (40) of a first conductivity type (n-type), Si well (40) has a surface plane (60), and Si well (40) contains at least one trench (54) downwardly extending from surface plane; an undoped epitaxial layer lining (20) with one trench (54), wherein undoped epitaxial layer comprises a $Si_{1-x}Ge_x$ layer (20) with $0<x<1$, wherein $Si_{1-x}Ge_x$ layer (20) has a thickness of (5nm, 15nm) which is below a critical thickness, wherein a cross sectional surface of undoped epitaxial layer (20) forms a band which is substantially aligned with said surface plane; and a second material (Si layer 30) of a second conductivity type disposed over undoped epitaxial layer (20) but not in contact with said band, (see fig. 1,

paragraph [0019], lines 1-21), paragraph [0020], lines 1-31), paragraph [0021], lines 1-32).

As to claim 2, Ouyang et al disclose one trench (54) has a depth larger than critical thickness.

As to claim 3, Ouyang et al disclose one trench (54) has a sidewall perpendicular to surface plane (60), (see fig. 1C).

As to claim 4, Ouyang et al disclose second material (Si layer 30, SiO2) fills up one trench (54).

As to claim 7, Ouyang et al disclose undoped epitaxial layer (20) consists essentially of $Si_{1-x}Ge_x$ (see fig. 3A, paragraph [0039], lines 1-7).

As to claim 8, Ouyang et al disclose first conductivity is p-type and second conductivity is n-type, (see fig. 2, paragraph [0026], lines 1-19, fig. 4, paragraph [0040], lines 1-22).

As to claim 9, Ouyang et al disclose first conductivity is n-type and said second conductivity is p-type, (see fig. 2, paragraph [0026], lines 1-19, fig. 4, paragraph [0040], lines 1-22).

As to claim 11, Ouyang et al disclose Si well (40) has a first doping level (Si), and Si well (40) is in contact with a monocrystalline Si body (40) of first conductivity type (n-type), wherein Si body (40) has a second doping level (SiGe), and wherein first doping level (Si) is higher than second doping (SiGe) level, (see fig. 1, paragraph [0019]).

As to claim 12, Ouyang et al disclose Si well (40) has a first doping level, and Si

well (40) is a monocrystalline Si body (40, 40'), (see fig. 2B, paragraph [0020].

As to claim 13, Ouyang et al disclose Si well (40) is in contact with a monocrystalline Si body (40) of second conductivity type (P-type), (see fig. 1, paragraph [0020], lines 1-31).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 5, 6, and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ouyang et al in view of Ryum et al (US2002/0058388).

As to claim 5, Ouyang et al disclose second material (Si layer 30, SiO2) and undoped epitaxial layer (20). Ouyang et al fail to teach second material is selected from group consisting of mono-crystalline Si, polycrystalline Si, amorphous Si, polycrystalline SiGe, amorphous SiGe, polycrystalline Ge, amorphous Ge, and their combinations. Ryum et al teach undoped Si layer, silicon oxide, monocrystalline, poly-crystalline, and amorphous. It would have been obvious for one ordinary skill in the art to modify Ouyang et al to include undoped Si layer, silicon oxide, mono-crystalline, poly-crystalline, and amorphous as disclosed by Ryum et al to improve and enhance carrier mobility to exist without creation of silicon defects, (see fig. 2a, paragraph [0012], lines 1-35).

As to claim 6, Ouyang et al does not exactly disclose $Si_{1-x}Ge_x$ layer (20) is essentially pure Ge. Ouyang et al disclose SiGe epitaxial channel layer (20) is 15% to 50% Ge concentrated. It would have been obvious for one ordinary skill in the art to include 15% to 50% composite of the Ge concentration to improve the compressed strain of the undoped epitaxial $Si_{1-x}Ge_x$ layer (20) in order to reduce the band gap and to enhance carrier mobility to exist without creation of silicon defects, (see paragraph [0018], lines 1-29).

As to claim 10, Ouyang et al disclose a Si well (40) and second material (Si layer 30, SiO2). Ouyang et al fail to disclose first electrical contact and second electrical contact. Ryum et al disclose electrodes (23). It would have been obvious for one ordinary skill in the art to modify Ouyang et al to include electrodes (23) as disclosed by Ryum et al to improve the reverse bias junction and increase the electric field across the undoped layer, (see fig. 1a, paragraph [0008], lines 1-35).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Don Williams whose telephone number is 571-272-8538. The examiner can normally be reached on 8:30a.m. to 5:30a.m..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Dave Porta can be reached on 571-272-2444. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Don Williams
Patent Examiner
Art Unit: 2878
Ph: 571-272-8538

DAVID PORTA
SUPERVISORY PATENT EXAM
TECHNOLOGY CENTER 28